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Indian Standard
**SPECIFICATION FOR
BARIUM CHROMATE FOR PAINTS**
(First Revision)

Raw Materials for Paints Industry Sectional Committee, CDC 50

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Indian Standard
SPECIFICATION FOR
BARIUM CHROMATE FOR PAINTS
(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 23 January 1981, after the draft finalized by the Raw Materials for Paints Industry Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard was first published in 1966 as an emergency Indian Standard, to meet the urgent needs of the country to replace import-based zinc chromate pigment by alternative indigenous corrosion inhibitive pigment. Through a study of literature and results of experimental investigations available, it was found that barium chromate would be suitable for this purpose. The standard was subsequently reviewed by the concerned technical committee and its emergency character was removed through an amendment issued in January 1968.

0.3 In this revision the requirement for barium oxide content has been modified from minimum 59.5 to 57.0 percent and that for chromic anhydride content from minimum 38.5 to 37.0 percent by mass based on experience gained during the use of the earlier version of this standard and also to align it with the corresponding standard published by International Organization for Standardization, ISO 2068-1972 Barium-chromate pigment for paints. This revised standard substantially corresponds to ISO 2068-1972.

0.4 This standard contains clause 4.1 which calls for agreement between the purchaser and the supplier.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS: 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes requirements and methods of sampling and test for barium chromate intended for use as a corrosion inhibitive pigment for paints.

*Rules for rounding off numerical values (*revised*).

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2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS:33-1976* and IS:1303-1963† shall apply.

3. REQUIREMENTS

3.1 Form and Condition — The material shall be in the form of dry powder or in such a condition that it would be possible to reduce it to the powder form by crushing without grinding action, under a palette knife.

3.2 Analysis of the Material — The material, dried as prescribed under 7.1 of IS:33-1976*, when analysed by the methods given in A-2, shall consist of not less than 57.0 percent by mass of barium oxide (BaO), and not less than 37.0 percent by mass of chromic anhydride (CrO_3) content, equivalent to not less than 94 percent by mass of barium chromate (BaCrO_4).

3.3 The material shall be free from visible impurities. It shall also be free from organic dyestuffs or substrate of any kind.

3.4 The material shall also comply with the requirements given in Table 1.

4. PACKING AND MARKING

4.1 Packing — The material shall be suitably packed as agreed to between the purchaser and the supplier.

4.2 Marking — Each container shall be legibly and indelibly marked with the following:

- a) Name of the material;
- b) Manufacturer's name and his recognized trade-mark, if any;
- c) Net mass of the material;
- d) Lot or batch number in code or otherwise; and
- e) Month and year of manufacture.

4.2.1 The containers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

*Methods of sampling and test for inorganic pigments and extenders for paints (*second revision*).

†Glossary of terms relating to paints (*revised*).

TABLE 1 REQUIREMENTS FOR BARIUM CHROMATE FOR PAINTS

(Clause 3.4)

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST, REF TO CL NO. IN	
			Appendix A	IS:33-1976*
(1)	(2)	(3)	(4)	(5)
i)	Volatile matter, percent by mass, <i>Max</i>	1.0	—	7
ii)	Residue on sieve, percent by mass, <i>Max</i>	0.5	—	8
iii)	Oil absorption	8 to 20†	—	9
iv)	Colour	Normal for barium chromate	—	10
v)	Matter soluble in water, per- cent by mass, <i>Max</i>	0.5	—	17
vi)	Water soluble sulphates and chlo- rides (as SO_4 and Cl), percent by mass, <i>Max</i>	0.1	A-3	—

*Methods of sampling and test for inorganic pigments and extenders for paints
(*second revision*).

†It shall be however within ± 5 percent of the sample approved against this speci-
fication, if any.

5. SAMPLING

5.1 Representative samples of the material shall be drawn as prescribed under 4 of IS:33-1976*.

5.2 **Criteria for Conformity** — A lot shall be declared as conforming to the requirements of this standard if the test results on the composite sample satisfy the requirements prescribed under 4.

6. TEST METHODS

6.1 Tests shall be conducted as prescribed in IS:33-1976* and in Appendix A. Reference to relevant clauses of IS:33-1976* is given in col 5 of Table 1 and to Appendix A in 3.2 and col 4 of Table 1.

*Methods of sampling and test for inorganic pigments and extenders for paints
(*second revision*).

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6.2 Quality of Reagents — Unless otherwise specified, pure chemicals and distilled water (*see* IS: 1070-1977*) shall be employed in tests.

NOTE—'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

APPENDIX A

[*Clauses 3.2 and 6.1; and Table 1, Item (vi)*]

METHODS OF TEST FOR BARIUM CHROMATE

A-1. PREPARATION OF SAMPLE

A-1.1 Grind the pigment if it is lumpy or not finely powdered. If the sample is large, mix thoroughly and take a representative portion (*see also 3.2*).

A-2. DETERMINATION OF BARIUM OXIDE AND CHROMIC ANHYDRIDE

A-2.0 Outline of the Methods — The pigment is dissolved in dilute hydrochloric acid and in the resulting filtrate barium is precipitated as barium sulphate and estimated. For estimation of chromic anhydride, the material is dissolved in hydrochloric acid and reacted with potassium iodide. The liberated iodine which is equivalent to the chromic anhydride content is estimated by titration against standard sodium thiosulphate solution using starch solution as indicator.

A-2.1 Reagents

A-2.1.1 Dilute Hydrochloric Acid — approximately 4 N.

A-2.1.2 Ammonium Hydroxide — relative density 0.90.

A-2.1.3 Concentrated Hydrochloric Acid — relative density 1.18 (*see* IS: 265-1976†).

A-2.1.4 Ammonium Sulphate Solution — 10 percent (m/v).

A-2.1.5 Potassium Iodide

A-2.1.6 Standard Sodium Thiosulphate Solution — 0.1 N.

A-2.1.7 Starch Solution — saturated.

A-2.1.8 Denatured Spirit — (*see* IS: 324-1959‡).

*Specification for water for general laboratory use (*second revision*).

†Specification for hydrochloric acid (*second revision*).

‡Specification for ordinary denatured spirit (*revised*).

A-2.2 Procedure

A-2.2.1 For Barium Oxide (BaO) — Weigh accurately 0.5 g of the material in a 400-ml beaker and dissolve in 50 ml of dilute hydrochloric acid by boiling and filter, if necessary. Add water to make the volume approximately 200 ml. Neutralize with ammonium hydroxide and add 2 ml of concentrated hydrochloric acid. Add denatured spirit and boil to reduce chromate to chromium. While stirring add slowly 20 ml of ammonium sulphate solution. Boil for 5 minutes and allow it to stand on the water-bath for atleast 4 hours or overnight. Filter the precipitate and wash it with water. Ignite and weigh as barium sulphate.

A-2.2.2 For Chromic Anhydride (CrO_3) — Weigh accurately 0.5 g of the material in a 500-ml conical flask. Add 25 ml of dilute hydrochloric acid and shake the flask for 2 to 3 minutes. Then add 25 ml of water and 3 g of potassium iodide to the solution. Cover the flask with a watch-glass and keep in a dark place for 3 to 5 minutes. Then titrate the liberated iodine with standard sodium thiosulphate solution using starch solution as indicator.

A-2.3 Calculation

A-2.3.1 Calculate barium Oxide (as BaO) as follows:

$$\text{Barium oxide (as BaO), percent by mass} = \frac{65.72 M_1}{M_2}$$

where

M_1 = mass in g of the barium sulphate obtained, and

M_2 = mass in g of dried pigment taken.

A-2.3.2 Calculate chromic anhydride (as CrO_3) as follows:

$$\text{Chromic anhydride (as } CrO_3 \text{), percent by mass} = \frac{V \times 0.003334}{M} \times 100$$

where

V = volume in ml of 0.1 N sodium thiosulphate solution required in the titration, and

M = mass in g of the material taken for test.

A-3. DETERMINATION OF WATER SOLUBLE SULPHATES AND CHLORIDES

A-3.0 Outline of the Method — Sulphates and chlorides are determined gravimetrically as barium sulphate and silver chloride respectively.

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A-3.1 Apparatus

A-3.1.1 Distillation Flask — 500-ml capacity.

A-3.1.2 Mechanical Shaker

A-3.2 Reagents

A-3.2.1 Hydrochloric Acid — approximately 5 N.

A-3.2.2 Ethyl Alcohol — 95 percent by volume or rectified spirit (*see* IS : 323-1959*).

A-3.2.3 Barium Chloride Solution — 10 percent, obtained by dissolving 12 g of barium chloride crystals in water and making up to 100 ml.

A-3.2.4 Concentrated Nitric Acid — (*see* IS : 264-1976†).

A-3.2.5 Silver Nitrate Solution — approximately 5 percent (*m/v*).

A-3.3 Procedure — Shake 20 g of the material with 200 ml of neutral distilled water in a chemically resistant glass flask for one hour on a mechanical shaker. Filter the mixture.

A-3.3.1 Sulphates — Acidify 50 ml of clear aqueous extract as obtained under A-3.3 with 3 ml of hydrochloric acid, adding a few millilitres of alcohol. Warm the solution to reduce the chromate which is noted by a change in colour to green. Boil the solution vigorously to drive off organic compounds, care being taken that the solution does not splash. Add excess barium chloride solution and allow to stand overnight. Filter the precipitated barium sulphate through a Gooch crucible. Wash the precipitate with hot water until washings are free of chlorides. Dry the crucible containing the precipitate and ignite it over a burner or in the muffle furnace at 600° to 700°C for half an hour. Cool in a desiccator and weigh.

A-3.3.2 Chlorides — Acidify 50 ml of the clear aqueous extract as obtained under A-3.3 with 10 ml of concentrated nitric acid and add a slight excess of silver nitrate solution. Coagulate the precipitated silver chloride by warming. Protect the precipitate from light by wrapping with black paper. Filter the precipitate through a sintered glass or Gooch crucible. Wash with water containing traces of nitric acid and dry at $100 \pm 5^\circ\text{C}$ to a constant mass.

A-3.4 Calculation

A-3.4.1 Water soluble sulphates (as SO_4),
$$= M_1 \times 2 \times 0.00082$$
 percent by mass

*Specification for rectified spirit (*revised*).

†Specification for nitric acid (*second revision*).

where

M_1 = mass in mg of barium sulphate (BaSO_4).

A-3.4.2 Water soluble chlorides (as Cl),
percent by mass $= M_2 \times 2 \times 0.0005$

where

M_2 = mass in mg of the silver chloride (as AgCl).

A-3.4.3 Add up the percentages of water soluble sulphates (**A-3.4.1**) and chlorides (**A-3.4.2**) and report the result.

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Panel for Inorganic Pigments, CDC 50:1:1

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